

## Claims

- [c1] 1. A test assembly for testing vehicle head restraints adapted to be coupled to a drive member capable of moving said test assembly, said test assembly comprising:
- a carriage adapted to be coupled to the drive member;
  - a head restraint coupled to said carriage; and
  - a manikin assembly coupled to said carriage comprising:
    - a head portion; and
    - a neck portion having an upper and lower end, said head portion coupled to said upper end of said neck portion, said manikin assembly coupled to said carriage at said lower end of said neck portion, wherein said head restraint is positioned adjacent said manikin assembly so that movement of said drive member causes said head portion of said manikin assembly to contact said head restraint.
- [c2] 2. The assembly of claim 1 wherein said manikin assembly further comprises at least one load cell for measuring a force acting on at least a portion of said manikin as-

sembly.

- [c3] 3. The assembly of claim 1 wherein said manikin assembly further comprises at least one accelerometer for measuring at least one of an acceleration and deceleration of at least a portion of said manikin assembly.
- [c4] 4. The assembly of claim 1 wherein a load cell is positioned at the upper and lower ends of said neck portion and an accelerometer is positioned at the upper and lower ends of said neck portion.
- [c5] 5. The assembly of claim 1 wherein said carriage further comprises at least one accelerometer for measuring at least one of an acceleration and deceleration of the carriage.
- [c6] 6. The assembly of claim 1 further comprising a mounting bracket coupled to said carriage, said head restraint coupled to said mounting bracket.
- [c7] 7. The assembly of claim 1 wherein said head restraint is adjustable relative to said carriage.
- [c8] 8. The assembly of claim 7 wherein said head restraint is moveable in a direction generally parallel to said carriage.
- [c9] 9. The assembly of claim 7 wherein said head restraint is

moveable in a direction generally perpendicular to said carriage.

[c10] 10. The assembly of claim 7 wherein said head restraint is angularly adjustable relative to said carriage.

[c11] 11. An apparatus for testing vehicle head restraints comprising:

a drive member capable of movement; and

a test assembly comprising:

a carriage adapted to be coupled to said drive member;

a head restraint coupled to said carriage; and

a manikin assembly coupled to said carriage comprising:

a head portion; and

a neck portion having an upper and lower end,

said head portion coupled to said upper end of

said neck portion, said manikin assembly coupled to said carriage at said lower end of said neck

portion,

wherein said head restraint is positioned adjacent said manikin assembly so that movement of said drive member causes said head portion of said manikin assembly to contact said head restraint.

- [c12] 12. The apparatus of claim 11 wherein said manikin assembly further comprises at least one load cell for measuring a force acting on at least a portion of said manikin assembly.
- [c13] 13. The apparatus of claim 11 wherein said manikin assembly further comprises at least one accelerometer for measuring at least one of an acceleration and deceleration of at least a portion of said manikin assembly.
- [c14] 14. The apparatus of claim 11 wherein a load cell is positioned at the upper and lower ends of said neck portion and an accelerometer is positioned at the upper and lower ends of said neck portion.
- [c15] 15. The apparatus of claim 11 wherein said drive member comprises:
  - a pendulum having an end pivotally coupled to a frame structure and capable of swinging movement about said end; and
  - a decelerator including at least one damper for engaging said pendulum and decelerating the swinging movement of said pendulum.
- [c16] 16. A method of testing a vehicle head restraint using a manikin assembly comprising a head portion and a neck portion having an upper and lower end, the head portion

coupled to the upper end of the neck portion, the method comprising:  
mounting the head restraint to a drive member;  
mounting the manikin assembly to the drive member at the lower end of the neck assembly; and  
moving the drive member; and  
causing the head portion of the manikin assembly to contact the head restraint.

- [c17] 17. The method of claim 16 wherein causing the head portion of the manikin assembly to contact the head restraint comprises accelerating the drive member so that the head portion of the manikin assembly contacts the head restraint.
- [c18] 18. The method of claim 16 wherein causing the head portion of the manikin assembly to contact the head restraint comprises decelerating the drive member so that the head portion of the manikin assembly contacts the head restraint.
- [c19] 19. The method of claim 16 further comprising measuring a force acting on at least a portion of the manikin assembly.
- [c20] 20. The method of claim 16 further comprising measuring at least one of an acceleration and deceleration of at

least a portion of the manikin assembly.

- [c21] 21. The method of claim 16 wherein mounting the head restraint and the manikin assembly to a drive member comprises mounting the head restraint and manikin assembly to a pendulum.
- [c22] 22. The method of claim 21 wherein moving the drive member comprises:
  - positioning the pendulum in a raised position; and
  - releasing the pendulum.
- [c23] 23. The method of claim 21 wherein causing the head portion of the manikin assembly to contact the head restraint comprises:
  - engaging the pendulum with at least one damper;
  - and
  - decelerating the swinging movement of the pendulum.
- [c24] 24. A method of testing a vehicle head restraint using a manikin assembly comprising a head portion and a neck portion having an upper and lower end, the head portion coupled to the upper end of the neck portion, the method comprising:
  - mounting the head restraint to a carrier;
  - mounting the manikin assembly to the carrier at the

lower end of the neck assembly;  
mounting the carrier to a pendulum;  
positioning the pendulum in a raised position;  
releasing the pendulum;  
engaging the pendulum with at least one damper;  
decelerating the swinging movement of the pendulum;  
causing the head portion of the manikin assembly to contact the head restraint.